FloodSAFE CALIFORNIA

DEPARTMENT OF WATER RESOURCES · STATE OF CALIFORNIA

Stressors to ecosystem processes:

Revetment

Tools and data for measuring Progress towards achieving the Basin-wide Feasibility Studies and Conservation Strategy Objectives

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Today's Presentation Objectives

- Provide Technical workshop participants with an understanding of:
  - Revetment as a stressor
  - Current status of the dataset
  - Briefly … value of the data in planning and identifying opportunities.

Outline

- Revetment as a stressor
- Study area
- Methods
- Results… status of data collection
- Analyses involving data

Conservation Strategy

- Meet legislative environmental direction
- Achieve CVFP Act (2008) environmental objectives
  - Promote **natural dynamic hydrologic and geomorphic processes**
  - Increase and improve **habitat quantity, diversity, and connectivity**
  - Promote the **recovery and stability of native species** populations
- Improve project delivery with environmental benefits
- Broaden collaboration, public support and funding
- Improve environmental conditions and trends

CVFSCS Objectives and Targets

- Ecosystem Processes
  - Inundated Floodplain
  - Geomorphic Processes
- Habitats
  - SRA
  - Riparian
  - Marsh
  - Agriculture
- Species
  - Target Species
  - T&E, Sensitive Species
- Stressors
  - Fish Passage
  - Revetment
  - Invasive Plants

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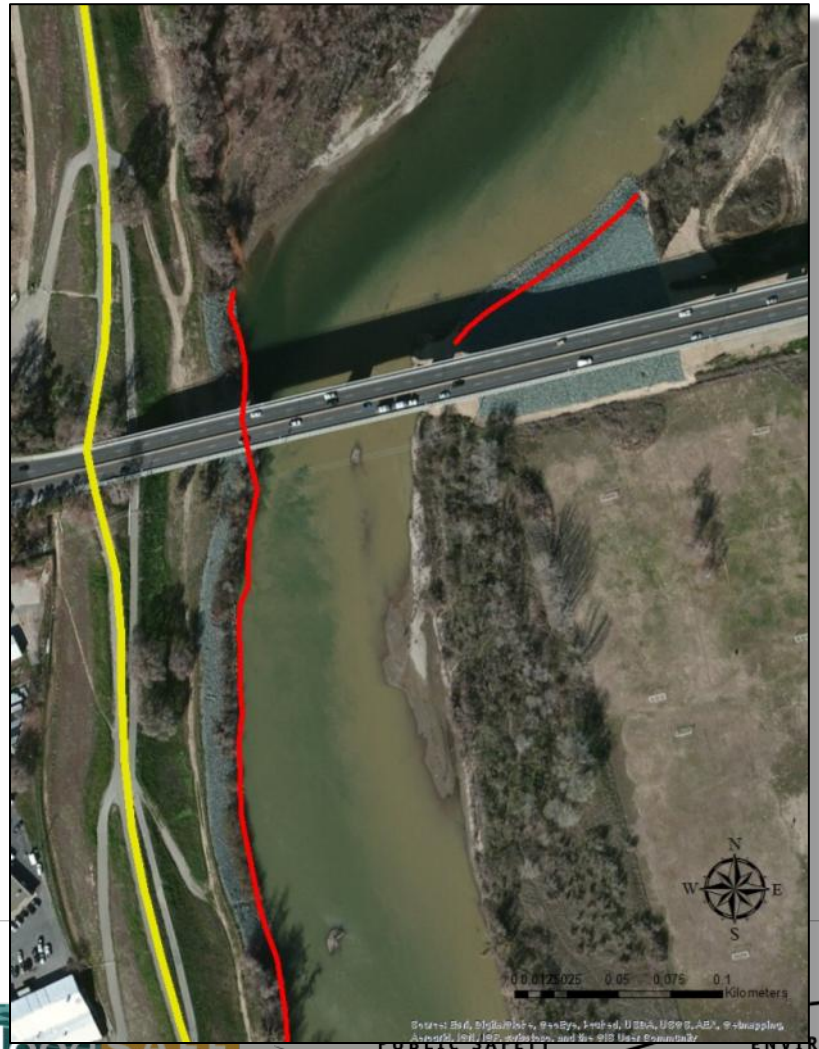
  - **Revetment**
  - Invasive Plants

Revetment

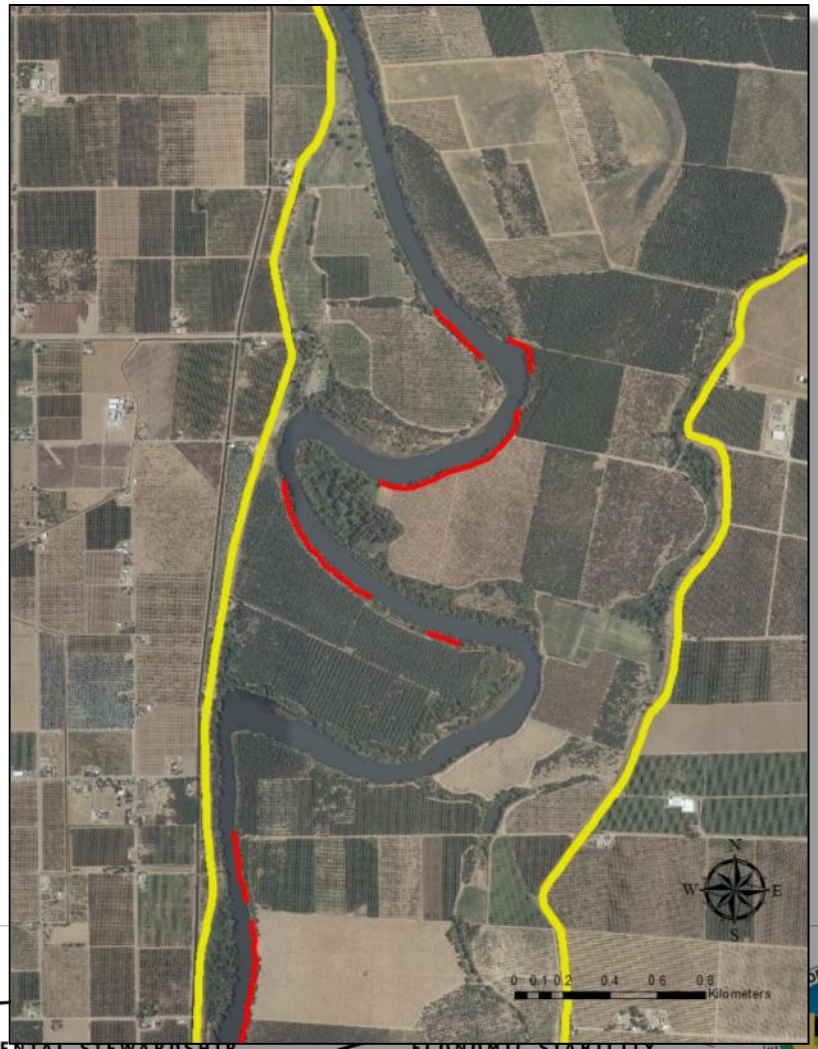
a.k.a. rip-rap, bank armor/protection, rock; Sloping back an eroding bank and placing resistant material (rock, cobble, rubble, etc.) in such a way as to absorb the energy of incoming water.

A Focus on the River System

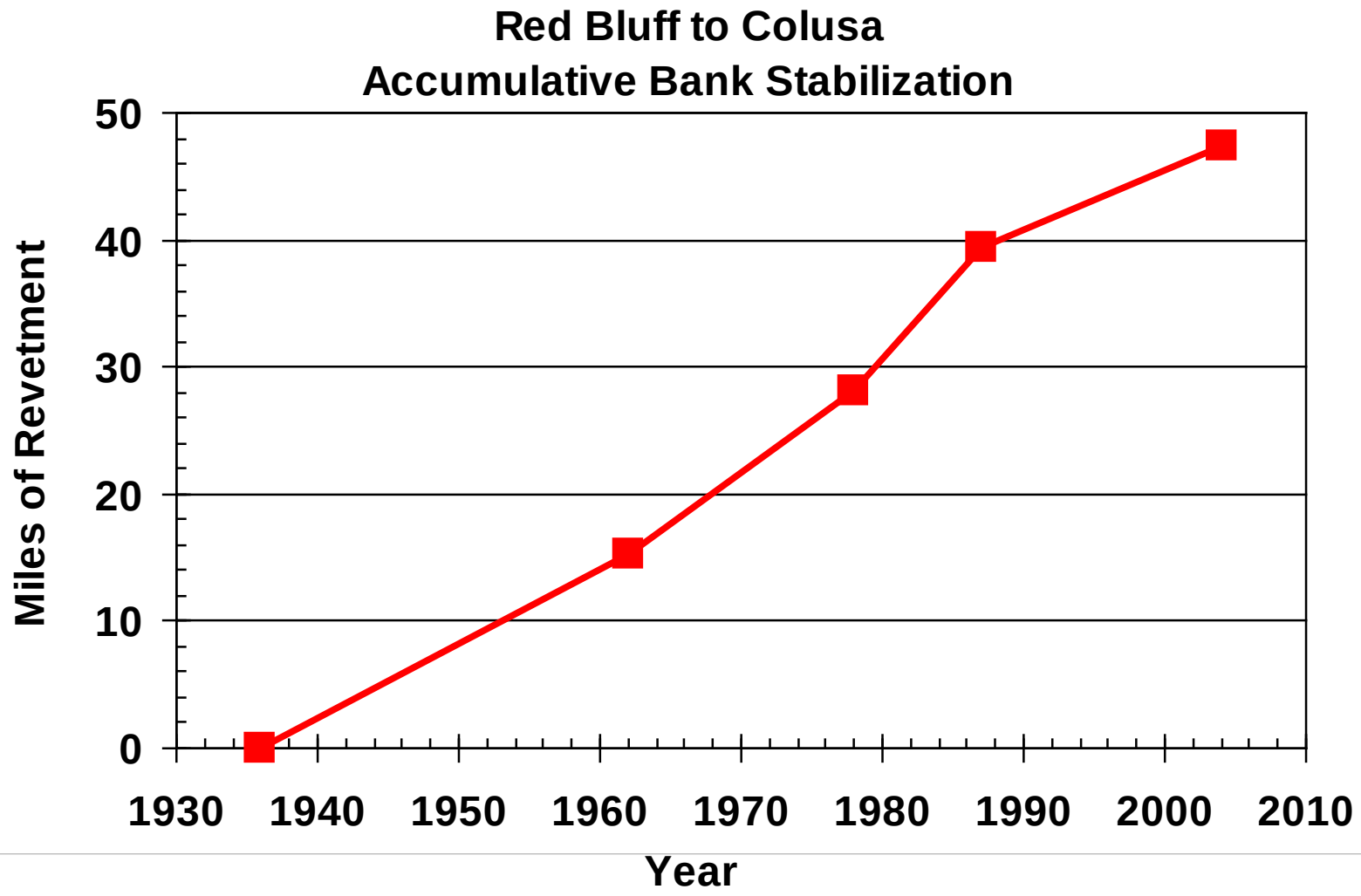
Levee and infrastructure protection



Bank protection



History of Revetment on the Sac River



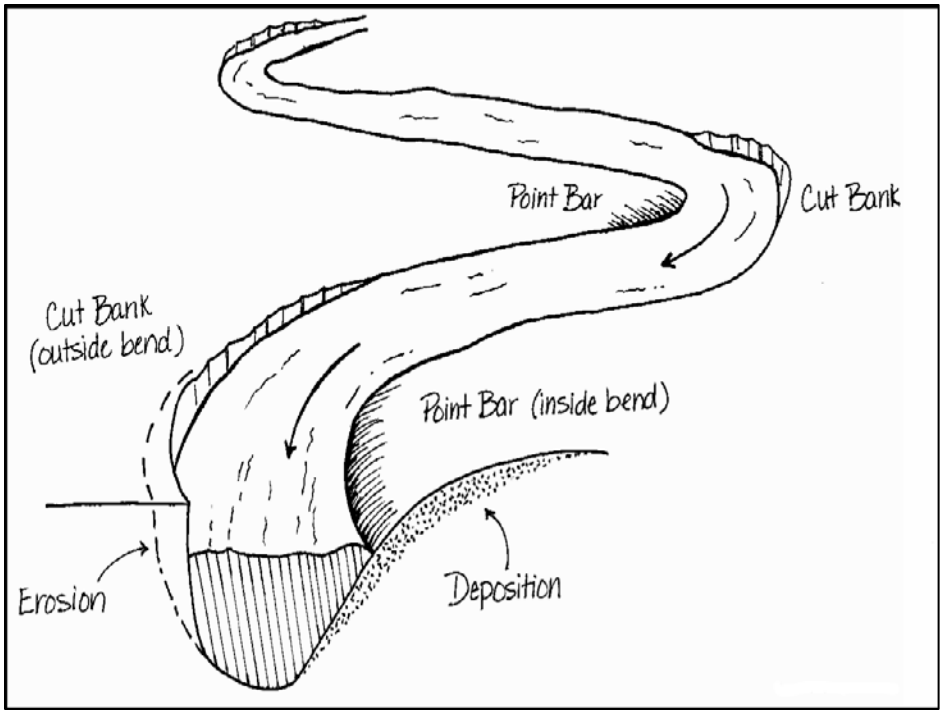

Red Bluff
Hamilton City
Butte City
OrdBend
Corning
Colusa
by 2002

Revetment of River Banks

Why is revetment considered a stressor?

Effects on Geomorphic Process and Habitats

Locally constrains channel migration



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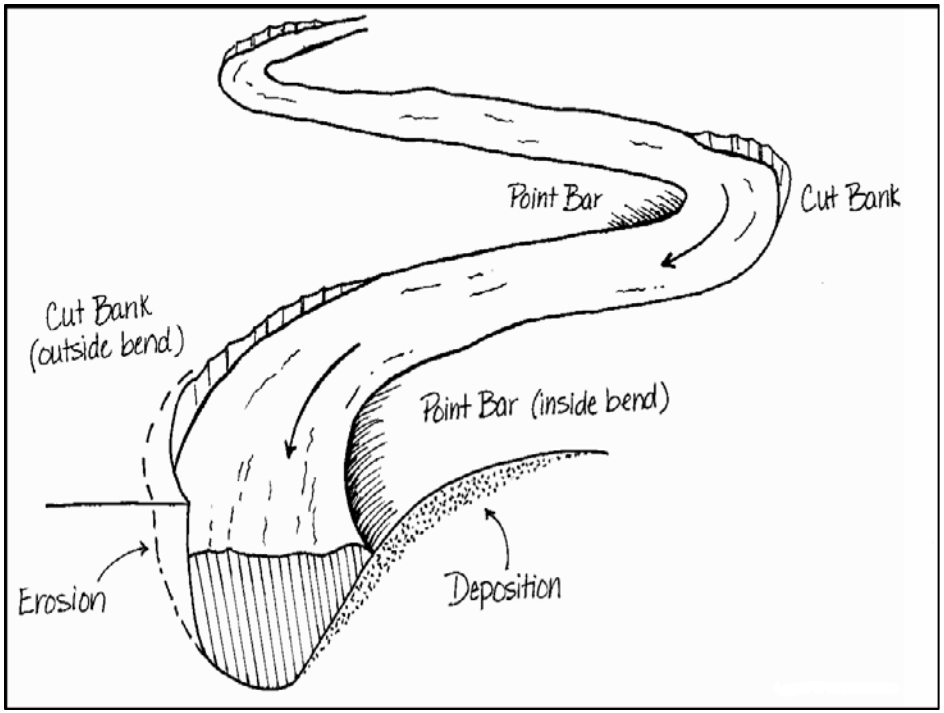

Effects on Geomorphic Process and Habitats

Prevents channel cut-offs (avulsions)

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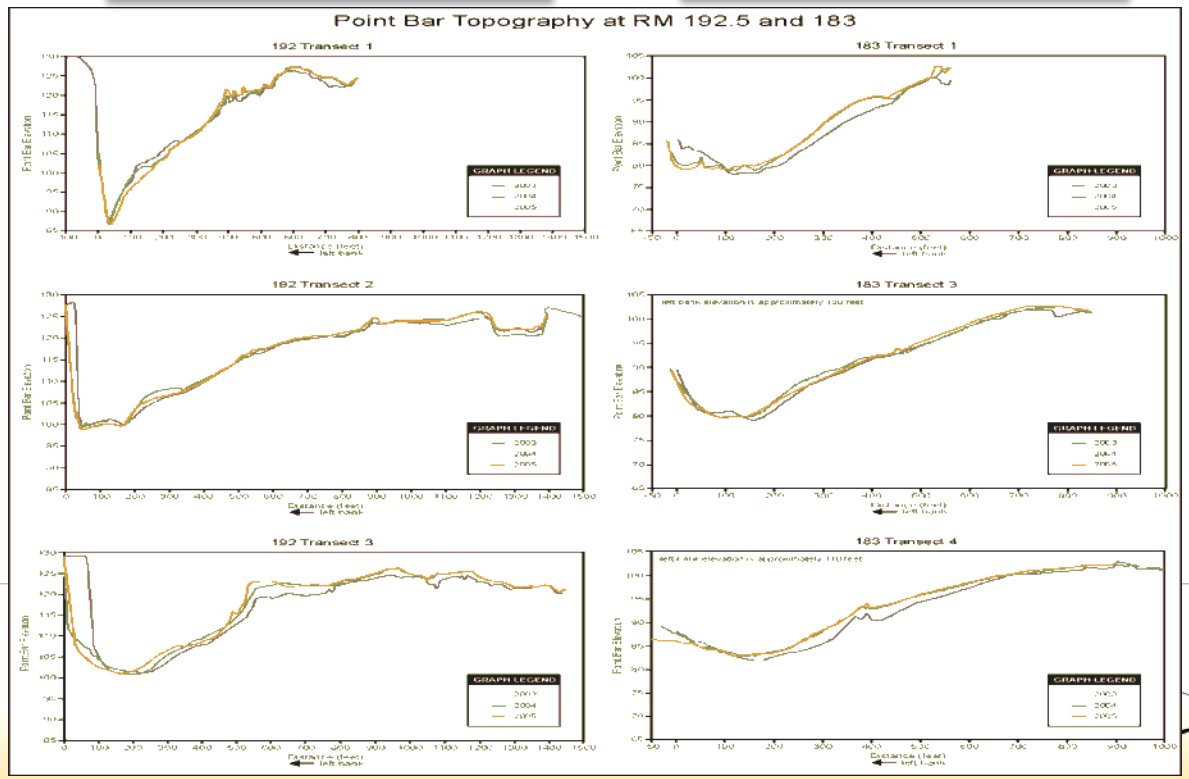
Effects on Geomorphic Process and Habitats

Alters channel geometry

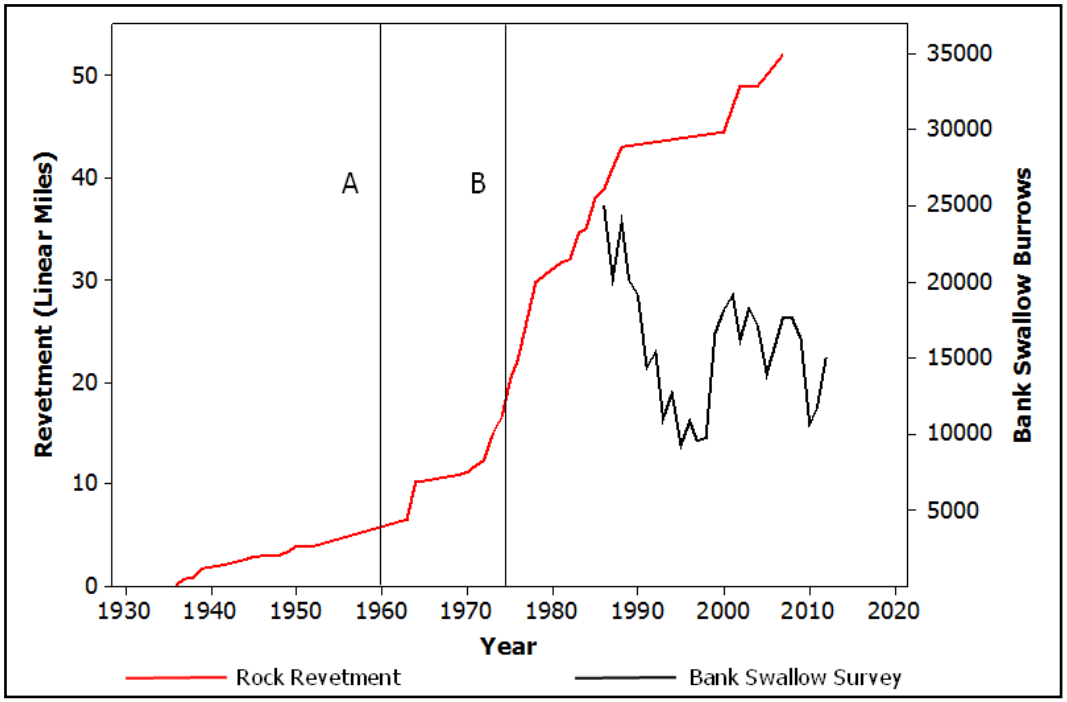


Effects on Species

Species declines due to effects on processes and habitats

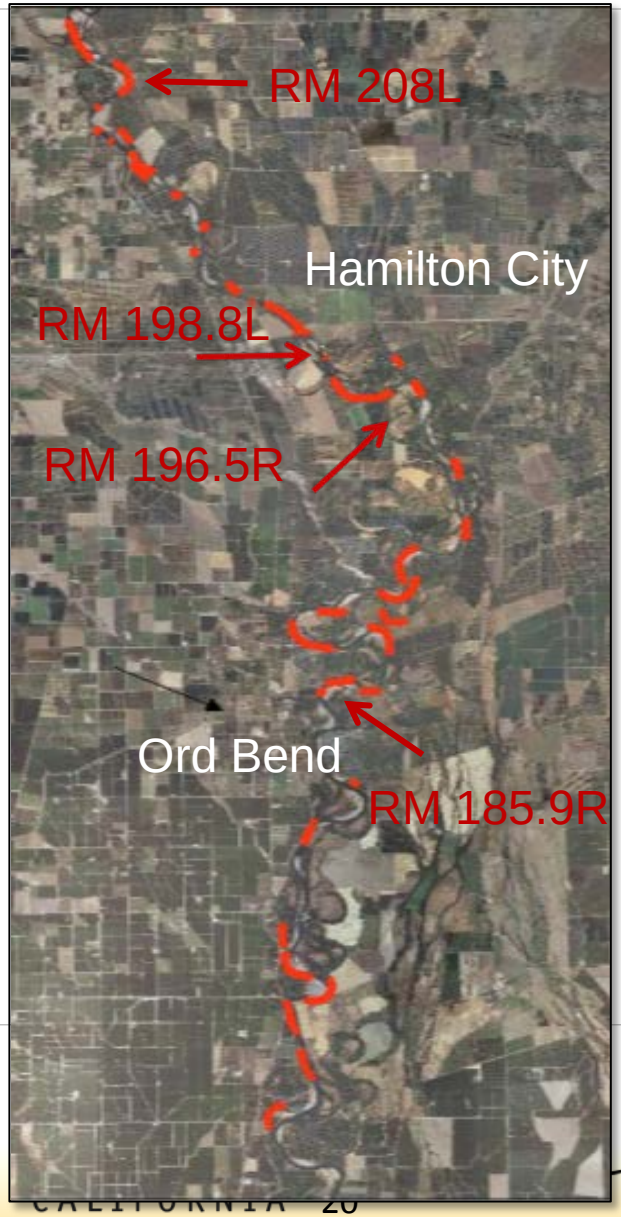
Effects on Species

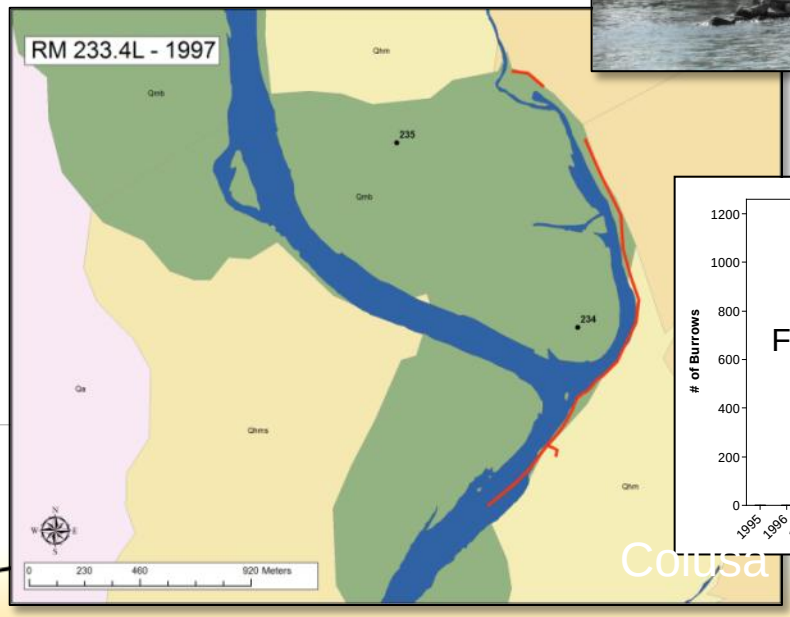
Bank Swallow decline on the Sacramento River

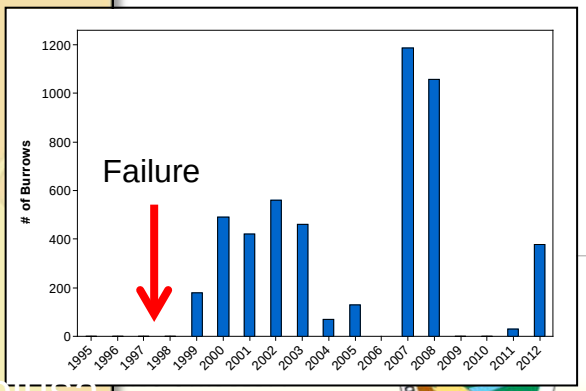


Sacramento River Cumulative Revetment, Red Bluff to Colusa (100 miles) since 1935 and Bank Swallow Burrow Counts since 1986

Bank Swallow Response to Removal







Stressor Summary

- Revetment has effects on the fundamental geomorphic processes which create aquatic and terrestrial riparian habitats
- Species (salmonids, sturgeon, Y-B Cuckoo, Bank Swallow) rely on these habitats
- CVFS Conservation Strategy
  - Improve process, habitats, species populations
  - Reduce stressors (revetment)

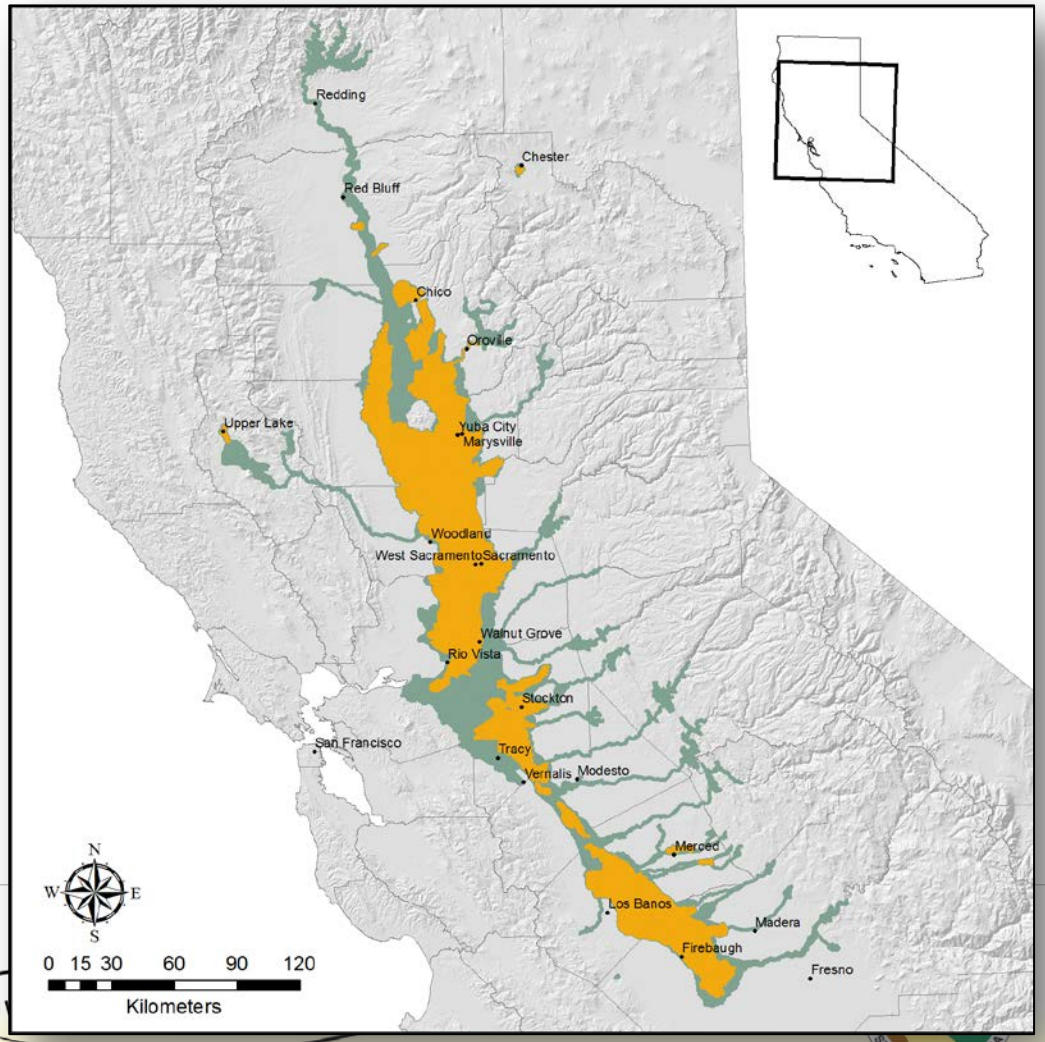
Revetment Survey Objectives

- Define the existing conditions
- Identify opportunities for improvement
- Define targets for Conservation Strategy
- Measure success of CS implementation

Study Area

- Sacramento River
- Feather River
- San Joaquin River

Systemwide Planning Area (SPA) and State Plan of Flood Control (SPFC)



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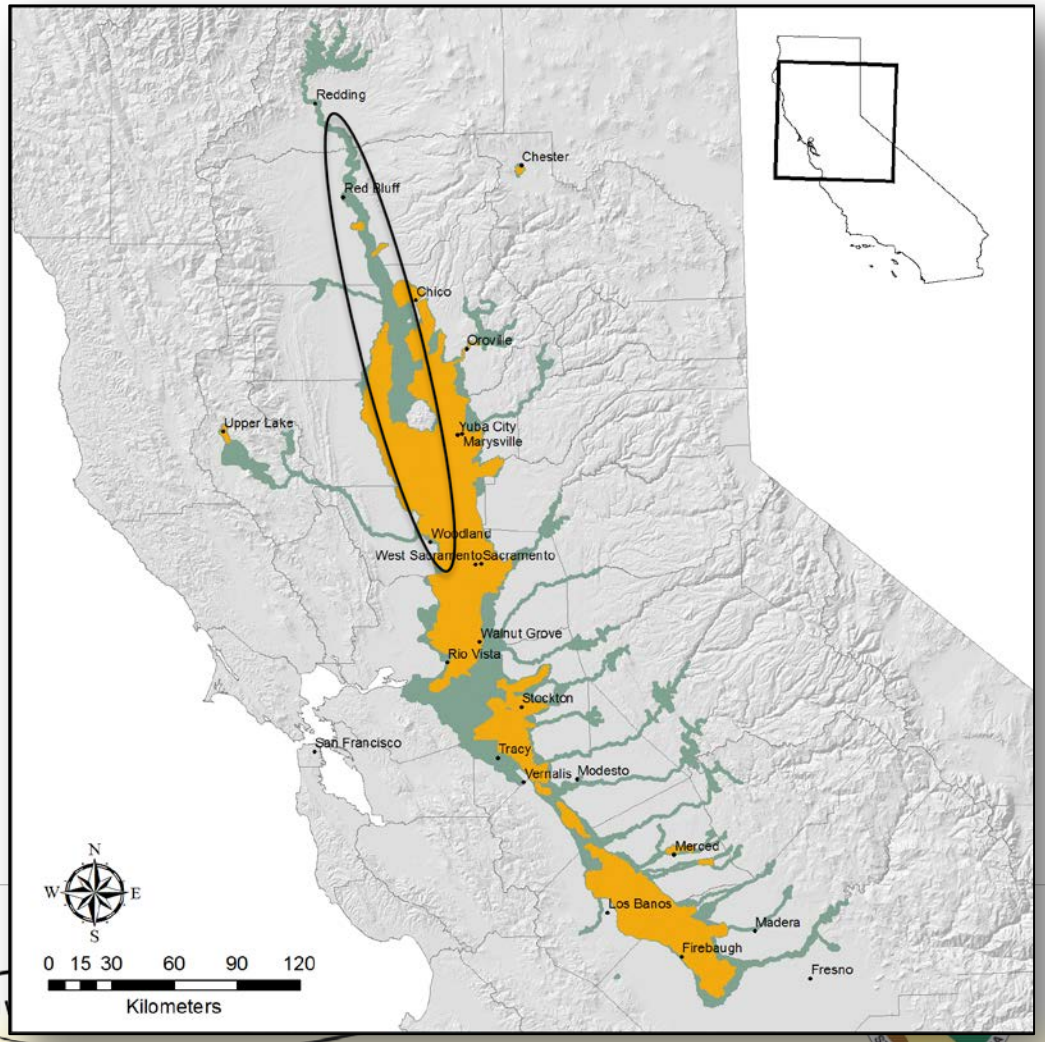

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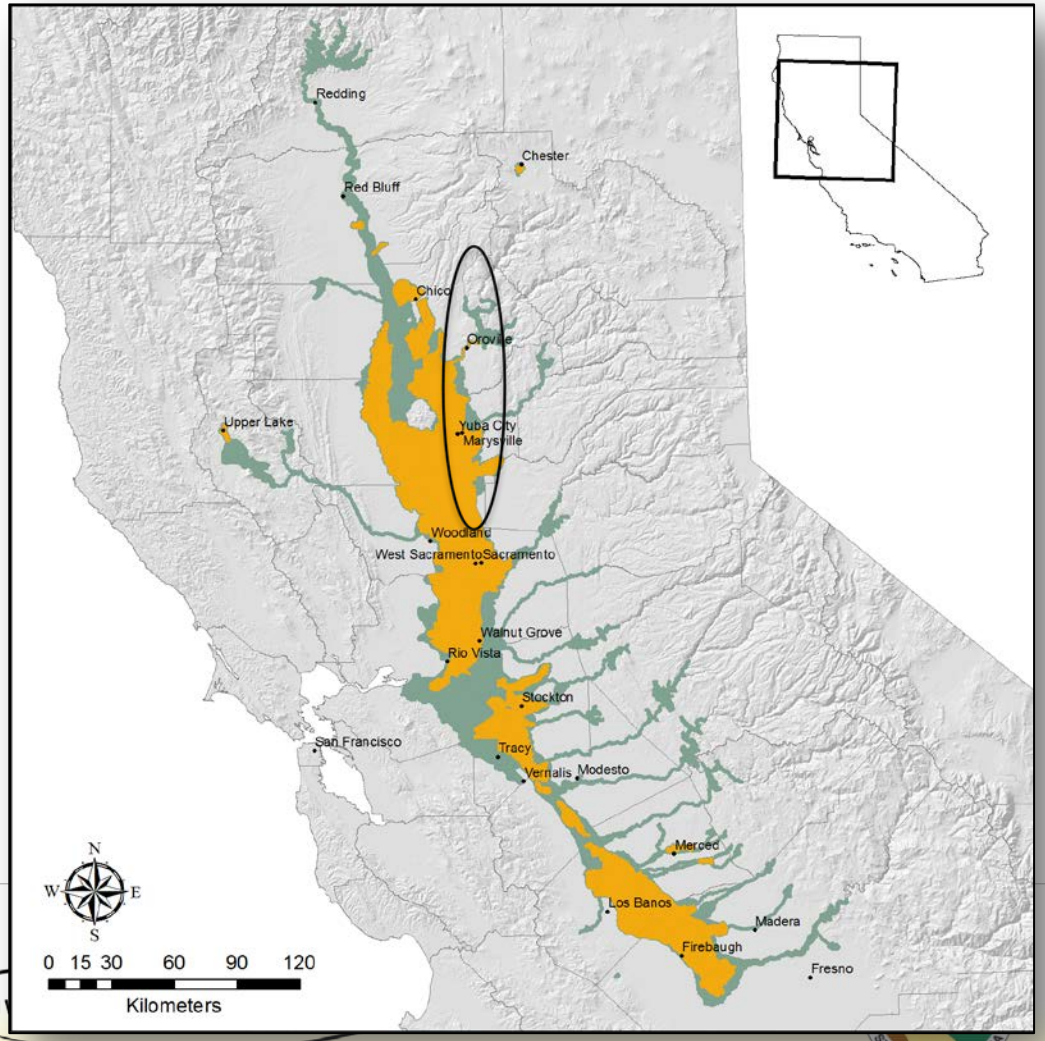

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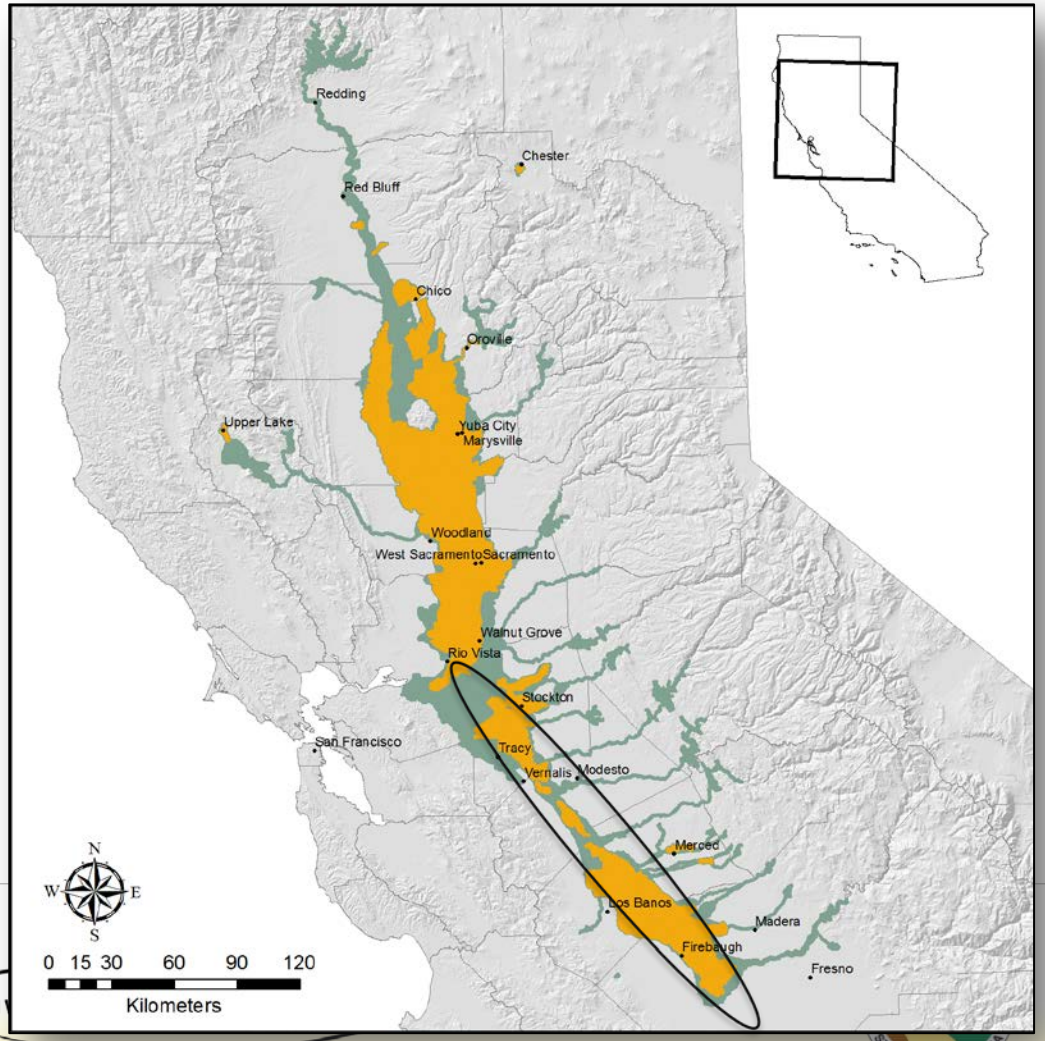
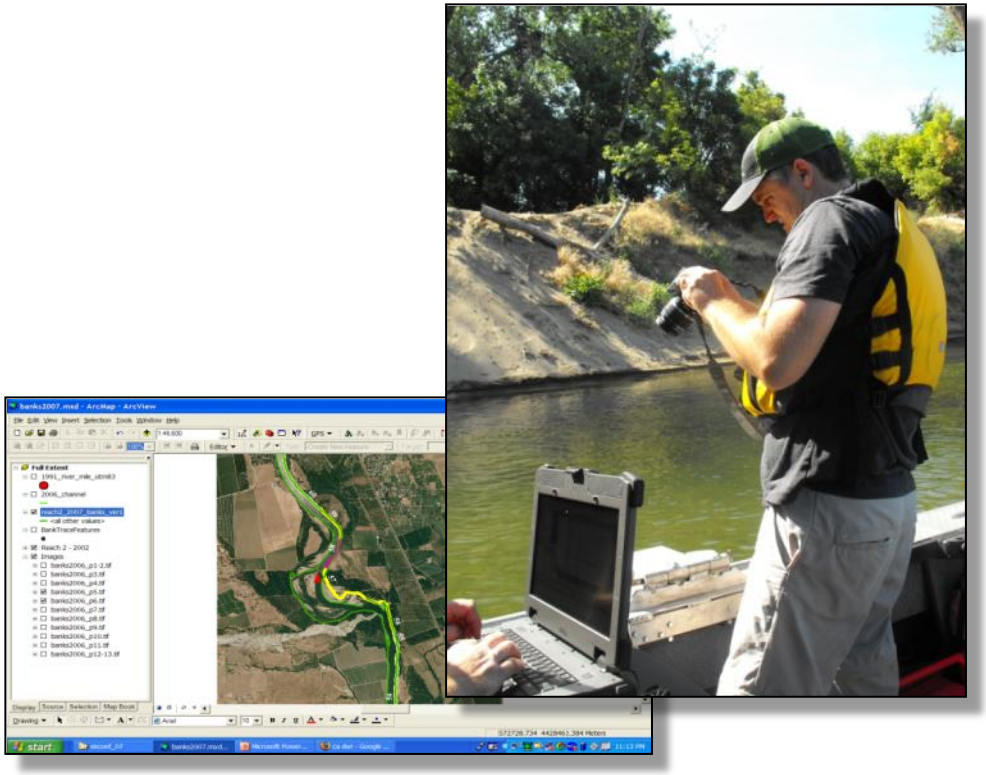


Methods

- Desktop exercise
  - Review of river atlases
  - GIS mapping
- Field data collection
  - Mobile GIS
  - 10m resolution



Attributes: (when available) origin, type of rock; date in (and out); photographs

Challenges

- Off channel rock – can be difficult to identify from the water
- River stage at the time of surveys affections detection
- Sediment or vegetation

Defining Existing Conditions

Update:

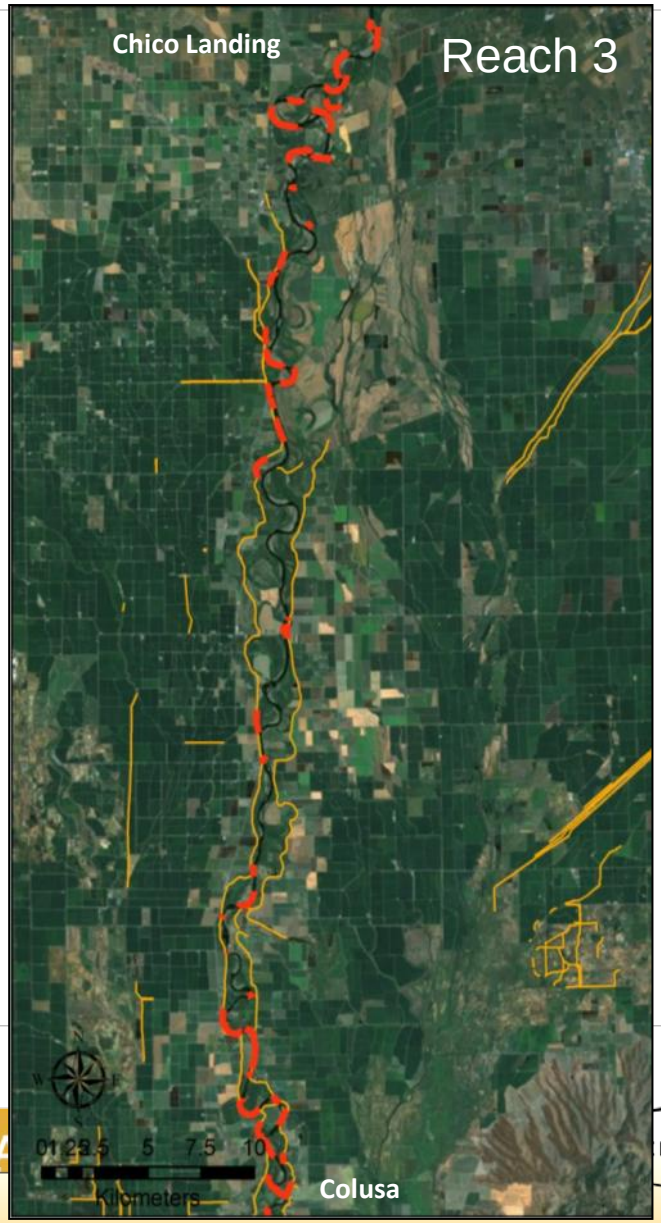
- **Sacramento River catalogue – currently updating**
- **Feather River catalogue – complete 2013**

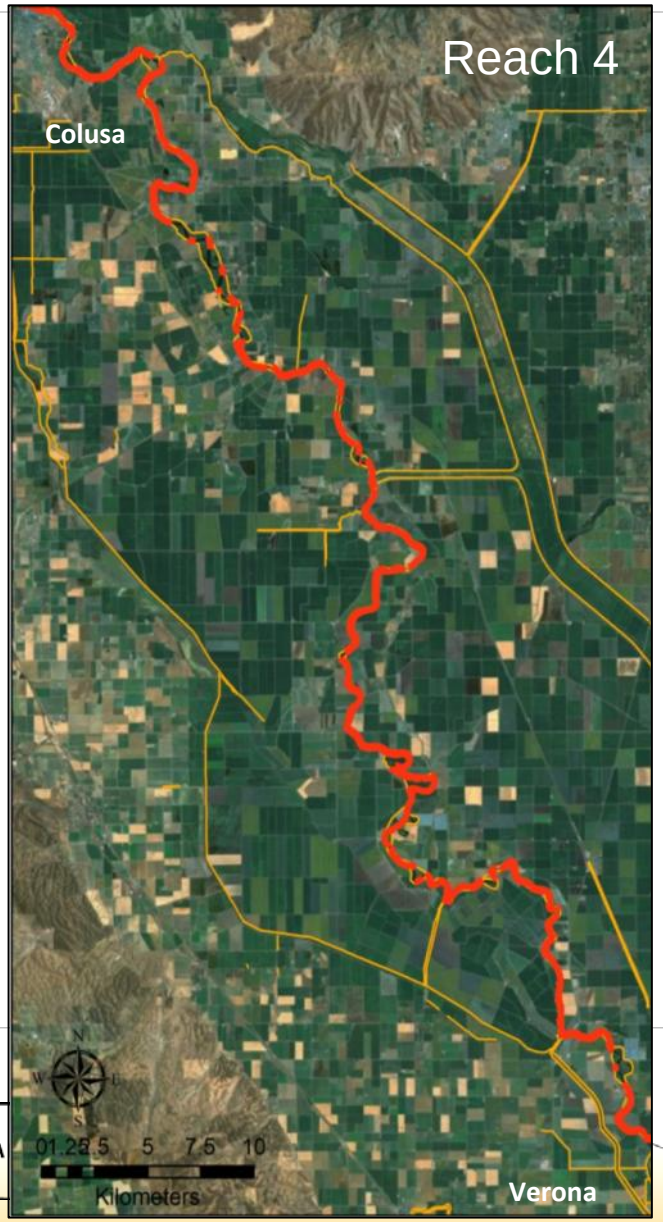
Develop a dataset:

- **San Joaquin River – to be surveyed early 2014**

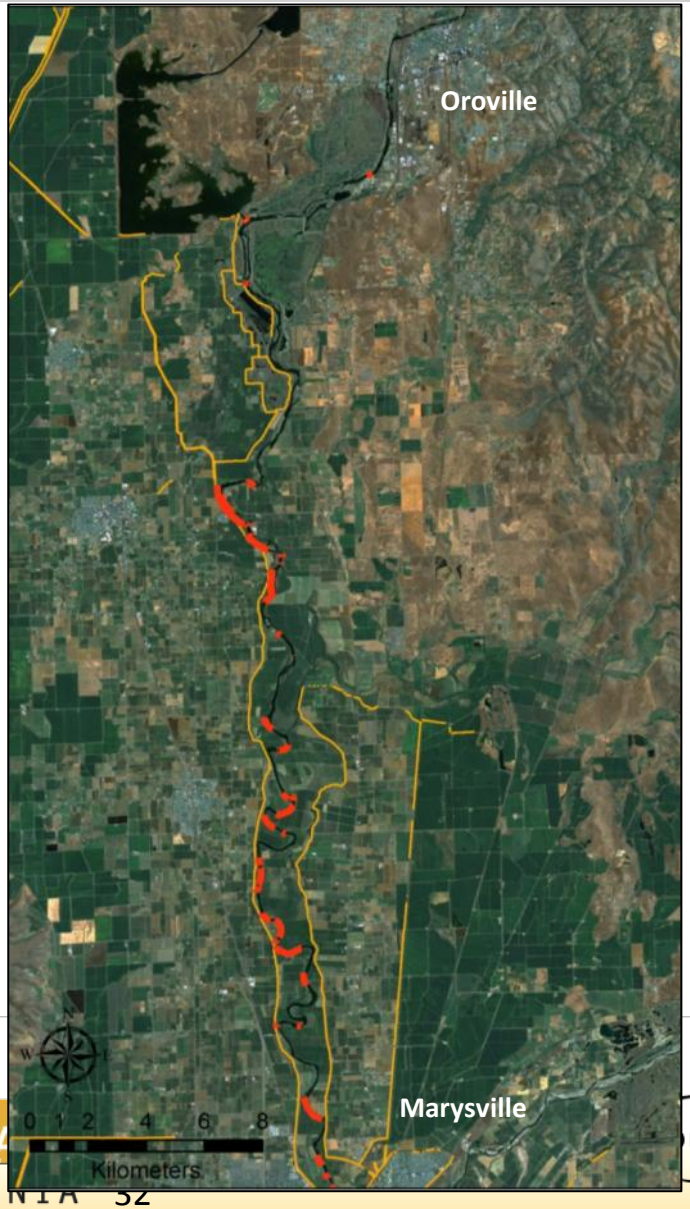
Sacramento River

Sacramento River

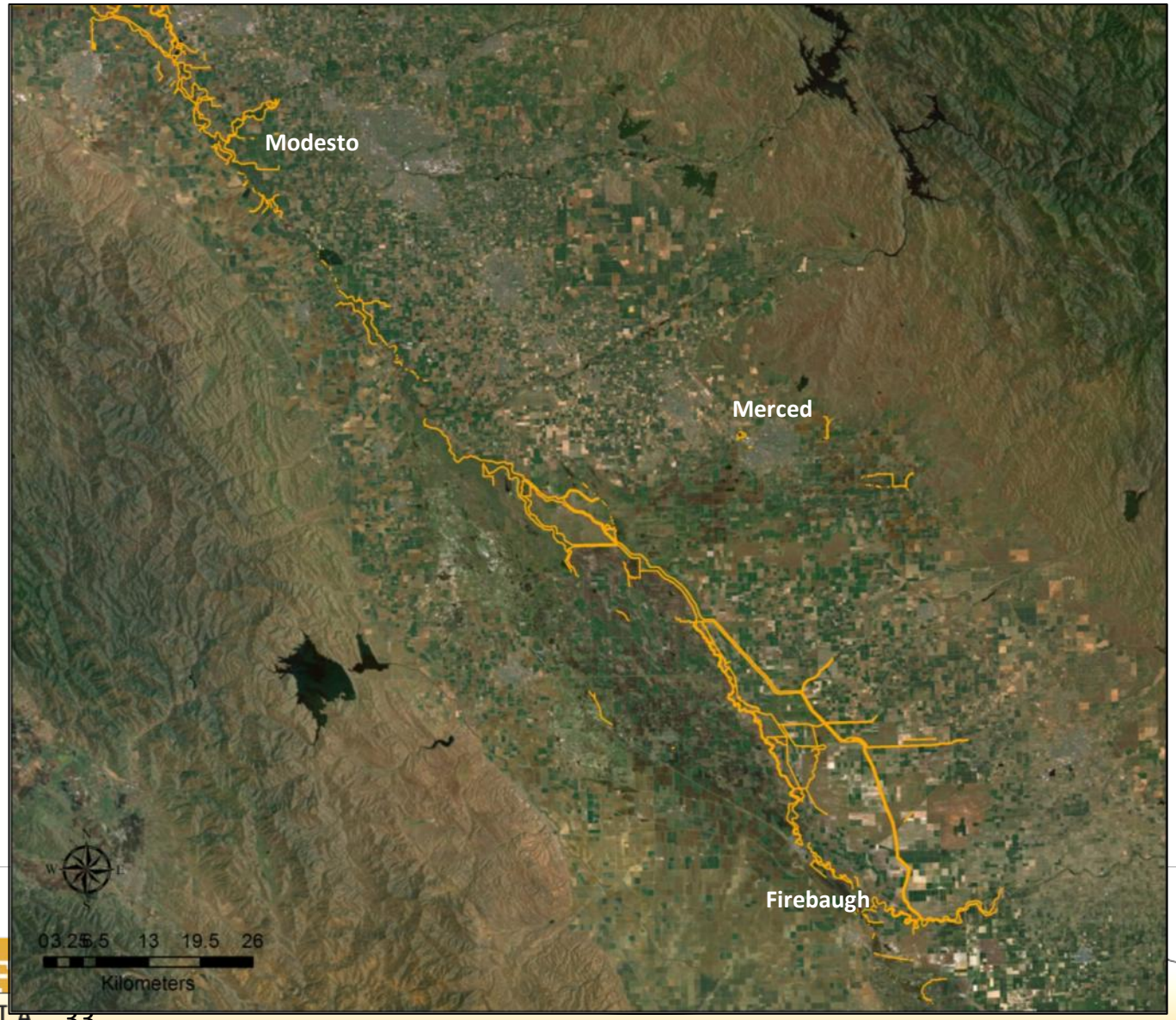




Feather River



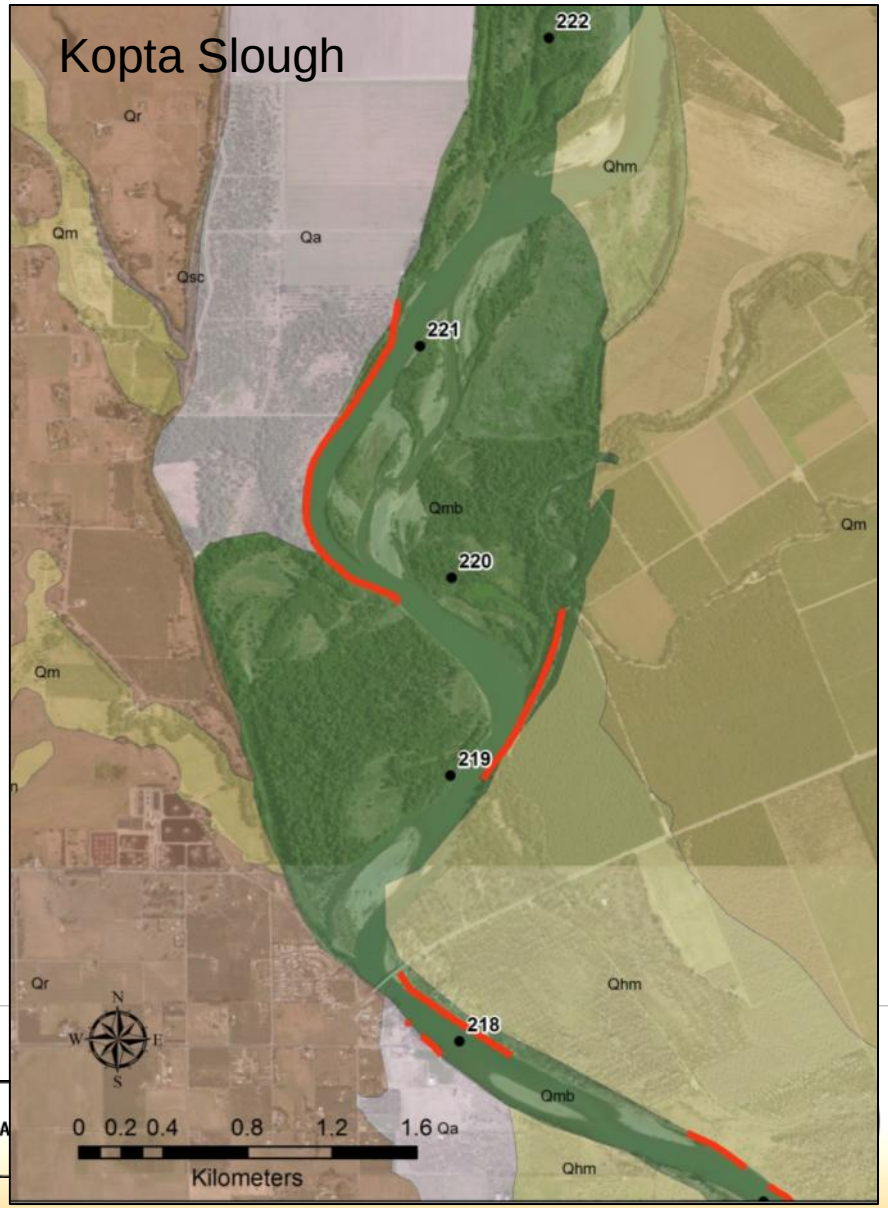
San Joaquin River



Identifying Removal Opportunities

Opportunity Analyses:

- Geology
- Proximity to infrastructure
- Land Ownership
- FROA



Need for Continued Monitoring

Revetment is not static over time:

- Staged or placed without permits - no documentation
- Blown out in high water events
- Improvements to the system will change distribution

Questions?